

In the Drawings:

Please include additional drawings, FIGS. 18 - 20, filed with this Response.

In the Specification:

Please amend the specification as follows:

After paragraph [0038] please insert the following:

[0038.1] FIG. 18 is a graph illustrating the reduction in machine direction tensile strength according to an embodiment of the present invention.

[0038.2] FIG. 19 is a graph illustrating the effect on fiber picking according to embodiments of the present invention.

[0038.3] FIG. 20 is a graph illustrating the effect on fiber picking according to embodiments of the present invention.

Please amend paragraphs [0042] and [0043] as follows, and delete Graph 1 interposed between paragraphs [0042] and [0043]:

[0042] Generally, for purposes of this invention, perforations are created when the strength of the web is locally degraded between two bypassing embossing elements resulting in either (1) a macro scale through-aperture or (2) in those cases where a macro scale through-aperture is not present, at least incipient tearing, where such tearing would increase the transmittivity of light through a small region of the web or would decrease the machine direction strength of a web by at least 15% for a given range of embossing depths. ~~Graph 1~~ FIG. 18 depicts a comparison of the effects on reduction of strength in the machine direction when perforate embossing a web, as defined herein, and non-perforate embossing a web. In particular, a conventional wet pressed base sheet was perforate embossed between two steel rolls. The same base sheet was non-perforate embossed in a rubber to steel configuration. In addition, a

through-air-dried base sheet was also perforate and non-perforate embossed. The reduction in machine direction strength was measured for each of the sheets. The results are plotted on Graph 4 FIG. 18.

~~Graph 1. Reduction of Machine Direction Tensile Strength~~

[0043] As shown in Graph 4 FIG. 18, when non-perforate embossing either a CWP or TAD web to depths of up to 40 mils, the reduction of paper strength in the machine direction is less than 5%. And, when non-perforate embossing either of the CWP or TAD webs at a depth of 80 mils, the reduction of strength of the web is less than 15%. When perforate embossing a web as disclosed in this invention, a greater reduction in strength of the web can be achieved. In the example set forth herein, strength reductions of greater than 15% are achieved when perforate embossing at depths of at least about 15 mils as compared to rubber to steel embossing which can result in these strength losses at emboss depths of over 60 mils. Accordingly, for purposes of this invention, perforation is specifically defined as locally degrading the strength of the web between two bypassing embossing elements resulting in either (1) the formation of a macro scale through-aperture or (2) when a macro scale through-aperture is not formed, at least incipient tearing, where such tearing would either increase the transmittivity of light through a small region of the web or would decrease the machine direction strength of a web by at least the percentages set forth in Graph 4 FIG. 18, wherein the "at least" percentages are indicated by the dashed line.

Please amend paragraphs [0067] - [0069] as follows, and delete Graph 2 and Graph 3 interposed between paragraphs [0067] and [0068].

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[0067] The element clearances for each of the sidewall angles of the first and second trials have been plotted against embossing engagement in ~~Graphs 2 and 3~~ FIGS. 19 and 20, respectively. The broken horizontal line on each plot indicates the caliper of a single ply of the base sheet that was embossed. The graphs in the figures have been annotated to show whether fiber picking was observed at each of the trial conditions (half step observation being to the left of the slash, full step observation to the right). The picking results are depicted in ~~Graphs 2 and 3~~ below FIGS. 19 and 20.

~~Graph 2. Fiber Picking With 45 mil Embossing Rolls--Beveled Ovals~~

~~Graph 3. Fiber Picking With 42.5 mil Embossing Rolls--Beveled Ovals~~

[0068] ~~Graph 2~~ FIG. 19 shows that for this particular trial using embossing rolls having a 45 mil element height, picking did not occur at any of the sidewall angles. However, as shown in ~~Graph 3~~ FIG. 20, when the embossing rolls having a 42.5 mil element height were run, fiber picking was observed on the 11° sidewall angle elements at the higher embossing engagements, i.e., 24, 28, and 32 mils. No fiber picking was encountered with elements having sidewall angles of 7° or 9°.

[0069] Based on the observed data, it appears that picking is a function of the element height, engagement, spacing, clearance, sidewall angle, alignment, and the particular physical properties of the base sheet, including base sheet caliper. An example of element clearance can be seen in FIG. 12, where the side profiles of the 42.5 mil elements (having 7°, 9°, and 11° sidewall angles) at 32 mil embossing engagement are shown. Clearance is the distance between adjacent engaging embossing elements. As noted above, the caliper of the embossed sheet for this trial was 6.2 mils. As shown in FIG. 12, the calculated or theoretical clearance at 7° is

0.004906" (4.906 mils), the clearance at 9° is 0.003911" (3.911 mils), and the clearance at 11° is 0.00311" (3.11 mils). Thus, for this trial at a 32 mil engagement, picking was observed only when the clearance was less than about ½ of the caliper of the sheet. Compare this to the clearances shown in FIG. 13. FIG. 13 depicts the sidewall profiles of the 42.5 mil elements at 28 mil embossing engagement. In this arrangement, the calculated or theoretical clearance at 7° is 0.006535" (6.535 mils), the clearance at 9° is 0.005540" (5.540 mils), and the clearance at 11° is 0.004745" (4.745 mils). In this trial, picking was observed when the clearance was less than about ¾ of the caliper of the sheet. Note, however, that when embossing at 32 mils, as described above, picking did not occur at 9°, while the clearance was less than 4.745 mils. FIG. 14 depicts the sidewall profiles of the 42.5 mil elements at 24 mil engagement. In this arrangement, the clearance at 11° is 0.005599" (5.599 mils), slightly less than the caliper of the sheet. As shown on ~~Graph 3~~ FIG. 20, picking did occur for these elements, but only when the elements were in full step alignment and not when in half step alignment. And, as shown in ~~Graph 2~~ FIG. 19, picking did not occur at all, at any angle, engagement, or alignment, for the 45 mil embossing rolls.